18. (a) Answer in detail about the structures of rock salt and wurtzite.

(b) Describe the structures of rutile and cadmium iodide.

19. (a) Elaborate about the powder diffraction method.

(b) Build the systematic absence of reflections.

20. (a) Write a note on Schottky and Frenkel defects with its consequences.

(b) Justify the linear defects with examples.

Shanmuga Industries Arts & Science College T.V.Malai

APRIL/MAY 2024

23PCH12 — STRUCTURE AND BONDING IN INORGANIC COMPOUNDS

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Give the structure of a silicate.
2. Write the Pauling electronegativity scale used for?
3. Make the Madelung constant depend on?
4. Draw the importance of radius ratio effect in crystal structure.
5. Mention the crystal structure of ZnS zinc blende.
6. Define hydrothermal method of crystal growth.
7. What is the principle of powder diffraction method?
8. Outline the basic principle of SEM.
9. What are linear defects?
10. Tell about the Fermi level in extrinsic semiconductor.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) Explain the preparation methods and structure of silicones.

Or

(b) Select the effect of lone pair of electron on the central atom in a geometry? Mention the significance of the bent's rule.

12. (a) Narrate the assumptions of the Kapustinskii equation. Mention the advantages of the Kapustinskii equation.

Or

(b) What is meant by symmetry operation? Give the simple symmetry operations?

13. (a) Construct the sol-gel method for nanoparticle synthesis? What are the advantages of sol-gel method for nanoparticles?

Or

(b) Classify the three types of perovskites? Draw the structure of the perovskite ion?

14. (a) A beam of X-rays of wavelength 0.071 *nm* is diffracted by (110) plane of rock salt with lattice constant of 0.28 *nm*. Find the glancing angle for the second-order diffraction.

Or

(b) Summarise the difference between SEM and TEM.

15. (a) Outline the difference between extrinsic and intrinsic semiconductors.

Or

(b) (i) Discuss the five applications of laser in our daily life.

(ii) What are some examples of phosphors?

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. (a) Discuss the structure of silicates.

(b) Explain the Wade's rule to predict the structure of Borane cluster.

17. Derive an expression for Born-Lande equation. Mention its importance.